

TAXONOMY AND DISTRIBUTION OF *RUBUS FRUTICOSUS* L. AGG. (ROSACEAE) NATURALIZED IN VICTORIA

by

R. L. AMOR* and the late B. A. MILES†

[EDITOR'S NOTE: During 1966 the senior author, R. L. Amor, commenced a detailed examination of all naturalized species of *Rubus* occurring in Victoria with the intention of determining the most satisfactory means of controlling these noxious weeds. His endeavours soon led him to conclude that this genus was a complex one and that its taxonomy required special attention. Subsequently he enlisted the aid of the late B. A. Miles (the junior author) in identifying the several species involved and later the two authors co-operated in the production of a paper on the taxonomy of the genus *Rubus* in Victoria. Unfortunately Mr. Miles died on 26th January, 1970, before he completed his taxonomic revision. However, Dr. Amor continued the preparation of this paper but was placed at a disadvantage with respect to its taxonomic content because he was unable to refer to Mr. Miles' notes which were presumably among his personal effects. The article presented below contains only one reference to a *type* specimen (*Rubus cissburiensis*) and it therefore lacks that data necessary for allowing credence to be given to the conclusions reached in applying the different species names referred to in the text. In spite of this obvious short-coming, the publication of this paper in its present form is deemed necessary because it provides Australian botanists with valuable data on the taxonomy of these species for immediate use, and it has been accepted for publication on this basis.]

SUMMARY

This paper describes the general morphology of blackberry (*Rubus fruticosus* L. agg.), the eight species of the aggregate and hybrids that are naturalized in Victoria, and the distribution of the taxa in both Europe and Victoria. The origin of the European *Rubus* flora, nomenclatural problems encountered in the segregates, the possible means by which the species were introduced into Victoria, and factors affecting their present distribution are also discussed.

INTRODUCTION

Gustafsson (1942) divided European blackberry species into two complexes, the *Moriferi veri* and the *Corylifolii*. He postulated that the progenitors of the *Moriferi veri* occurred in Pliocene times and that some of the primary species survived the last glaciation and spread when conditions became more favourable. Recent blackberry species are presumably progenies and segregates of hybrids between the primary species. Gustafsson considered that the *Corylifolii* originated as crosses between the *Moriferi veri* and the dewberry (*Rubus caesius*).

* Keith Turnbull Research Station, Frankston, Victoria.

† South London Botanical Institute, England.

Muelleria 3 (1): 37-62 (1974).

The term *R. fruticosus* agg., as it is now used, does not include *R. caesius* or the *Corylifolii* (Heslop-Harrison, 1968).

The basic chromosome number in *Rubus* is $n = 7$ and there are a range of polyploids (Heslop-Harrison, 1953). Only one British species (*R. ulmifolius*) is known to be a sexually reproducing diploid, and 4.3 per cent. of the other species are triploid, 90.7 per cent. tetraploid, 3.4 per cent. pentaploid and 0.8 per cent. hexaploid. Heslop-Harrison showed that these proportions are more or less similar to those in continental *Rubus* species.

Most European blackberry species produce seed by pseudogamy. Apomixis in the aggregate is facultative, and new apomictic biotypes arise occasionally by hybridization between different pseudogamous species or between sexual and pseudogamous species (Gustafsson, 1942). The large number of species and the lack of standardized sampling procedures and nomenclature used in the past have led to much confusion in the nomenclature. References to the key works of Focke, Sudre, Rogers and others are listed by Watson (1958).

The taxonomy of blackberry has received little attention in Australia. In Queensland and Western Australia blackberry is referred to as *R. fruticosus* L. (Everist, 1957; Meadly, 1965); in Victoria and Tasmania as two taxa—*R. fruticosus* L. and *R. laciniatus* Willd (Ewart, 1930; Curtis, 1956); and in New South Wales as *R. vulgaris* Weihe & Nees (Whittet, 1958; Beadle, Evans and Carolin, 1962). In South Australia, Eichler (1965) considers that there are several species, including *R. procerus* P. J. Muell.; *R. ulmifolius* Schott, *R. sp.* (aff. *R. fuscus* Weihe & Nees) and *R. sp.* (aff. *R. koehleri* Weihe & Nees). The taxonomy and distribution of the eight species of *R. fruticosus* agg. naturalized in Victoria are described below.

METHODS

The distribution of *Rubus fruticosus* agg. in Victoria, based on its presence in the 140 Lands Department Inspectors' Districts, was known from a preliminary survey (Amor, 1968), and the same mapping unit was used in this study. To ensure that the main occurrences of blackberry in each district were examined, inspections were carried out in the company of the local inspectors responsible for the control of blackberry and other noxious weeds. Specimens were collected from up to six localities for each species, the number of localities depending on the geographic range of the species.

The specimens consisted of the following material:

- (a) Pieces of stem, approximately 8cm long, with leaves attached. These stem pieces were taken from the

middle of a primocane* and not from the basal one metre of the cane.

(b) A complete inflorescence, usually bearing flowers and young fruit.

(c) Separate petals.

Further details of desirable methods of collecting *Rubus* specimens are given by Watson (1958) and Edees (1959).

The descriptions that follow refer to plants growing in a fairly sunny situation. In deep shade most species have green stems and are generally less tomentose and more pilose. When plants were growing in full sunlight the colour of the petals was noted in an opening bud, because the petals are soon bleached. Unless stated otherwise, the leaves described are those on the primocanes. Hairiness of carpels is described at anthesis. Definitions of the terms used above and in the following pages are shown in Figure 11.

The species were identified initially by B. A. Miles and the identifications confirmed by E. S. Edees, Dartmouth Avenue, Newcastle, England. Duplicate herbarium specimens have been filed at the Keith Turnbull Research Station, the National Herbarium of Victoria (Melbourne), and the Botany School of the Cambridge University, England.

DESCRIPTIONS

Rubus L. Subgen. *Rubus* (*Rubus fruticosus* L. agg.)

Prickly perennial *shrub* often forming large clumps 0.3–7m high. *Roots* perennial. *Stems* biennial or less often perennial, arching and rooting where the apices touch the ground, sharply to bluntly 5-angled, bearing prickles on the angles and often on the faces, glabrous or pilose and/or tomentose, and often also bearing glands and pricklets, overwintering (leaves usually deciduous) and producing in their second (and sometimes subsequent) year flowering branches from axillary buds formed the previous autumn. *Leaves* alternate, petiolate, stipulate, with 3–5 leaflets; leaflets shortly stalked, their upper surfaces glabrous or pilose, their lower surfaces thinly to strongly pilose, often also tomentose; always toothed; armature of petioles and petiolules similar to that of stem. *Flowering branch* a leafy elongated cyme, pyramidal to cylindrical in outline; all branches of the inflorescence subtended by either leaves or bracts (the leaves grading from proximally digitate to distally simple); armature and indumentum of branches similar to that of stem, but always more dense. *Flowers* hermaphrodite, actinomorphic, weakly perigynous, usually 5-merous, 2–3cm in diameter. *Hypanthium* (disc) flat, with a large convex receptacle. Sepals usually five, entire. *Petals* five, alternating with the sepals, caducous, white to deep pink. *Stamens* numerous, arising from

* A first-year cane. These do not bear flowers (Bailey, 1941).

STEM (T.S.)



Round



Angled, flat sides



Angled, concave sides

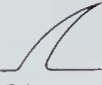
ARMATURE



Patent prickle



Deflexed prickle



Falcate prickle



Pricklet



Stalked gland

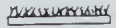
INDUMENTUM



Glabrous



Pilose



Tomentose

TERMINAL LEAFLET



Elliptical



Suborbicular



Obovate



Acuminate



Mucronate



Rounded



Crenate

INFLORESCENCE



Cylindrical



Pyramidal

FLOWER



Anthers at same level as stigmas



Anthers at higher level than stigmas

Fig. 11.—Terms used to describe parts of *Rubus* plants.

the rim of the hypanthium; filaments slender, white or more rarely pink; anthers yellow, versatile. *Carpels* numerous, free, glabrous or pilose. *Styles* subterminal, filamentous, greenish-white to pink, *Ovules* two, of which only one develops. *Fruit* a coherent head of black, shiny one-seeded drupelets, adherent to the convex receptacle. *Seeds* reticulate. *Cotyledons* two, elliptic, ciliate.

KEY TO SPECIES OF *R. fruticosus* agg. IN VICTORIA

- 1 Primocane with abundant stalked glands 9 *R. rosaceus*
 Primocane with few or no stalked glands 2
- 2 Leaflets deeply divided (at least $\frac{1}{2}$ way to midrib) 2 *R. laciniatus*
 Leaflets not deeply divided 3
- 3 Stalked glands present on rachis, branches and sepals of inflorescence 4
 Inflorescence eglandular 6
- 4 Primocane strongly pilose 8 *R. vestitus*
 Primocane glabrous or very slightly pilose 5
- 5 One simple leaf above ternate leaves in inflorescence; petioles of inflorescence leaves with glands not more than 0.5mm long; lower portion of rachis of inflorescence pilose; petals 1.0–1.4 times as long as broad, not notched. 3 *R. polyanthemus*
 Two or more simple leaves above ternate leaves in inflorescence; petioles of inflorescence leaves with some glands up to 1mm long; lower portion of rachis of inflorescence glabrous or nearly so; petals 1.5–1.8 times as long as broad, notched 4 *R. cissburiensis*
- 6 Lower surface of leaves white tomentose but not pilose 5 *R. ulmifolius*
 Lower surface of leaves pilose, sometimes also tomentose 7
- 7 Terminal leaflet suborbicular, prickles on peduncles strongly curved; anthers at same level as stigmas; petals strongly notched 1 *R. selmeri*
 Anthers at higher level than stigmas; not with the same character combination as *selmeri* 8
- 8 Lower surface of leaves on stem green, not or slightly felted, leaves mostly obovate 3 *R. polyanthemus*
 Lower surface of leaves on stem grey or white felted, leaves usually not obovate 9
- 9 Primocane more or less glabrous, sides usually concave 7 *R. procerus*
 Primocane often pilose and often with slightly felted sides flat 6 *R. ulmifolius* hybrids

1. **Rubus selmeri** Lindeb. *Herb. Rub. Scand.* 2: no. 33 (1884); F. Aresch. in *Bot. Not.* 1886: 76 (1886); *Sudre Rubi Eur.* 24 (1908); Focke in *Bibliothca Bot.* 83: 138 (1914); Y. Heslop-Harrison in Tutin et al. *Fl. Europaea* 2: 11 (1968). *R. villicaulis*



Fig. 12.—*R. selmeri*. Scale = 5cm.

subsp. *selmeri* (Lindeb.) Rogers *Handb. Brit. Rubi* 35 (1900). *R. nemoralis* sensu W. C. R. Watson *Hand. Rub. Gt. Brit. Ireland* 66 (1958), non P. J. Mueller in *Flora Regensb.* 41: 139 (1858). [Fig. 12.]

Stem brown to deep purple, glabrous or thinly pilose, eglandular, not tomentose; faces more or less, concave; prickles mostly deflexed, some more or less falcate. *Leaves* 5-partite; petioles and petiolules pilose, armed with falcate prickles; upper surface of leaflets more or less glabrous, lower surface softly and densely pilose and green to greyish tomentose; terminal leaflet suborbicular occasionally broadly elliptic, apex acuminate, occasionally mucronate, base rounded. *Inflorescence* cylindrical or subpyramidal in outline, rachis and all branches pilose and very thinly tomentose, armed with strong, large-based, falcate prickles. *Sepals* with short, green, linear tips their outer surfaces densely pilose and tomentose (hair often yellowish),



Fig. 13.—Distribution of *R. selmeri* in Victoria, based on presence in Lands Department Inspectors' Districts.

with a few tiny pricklets. *Petals* pink, 8–11mm long, broadly elliptic-obovate, strongly notched at apex. *Anthers* at same level as stigmas; filaments often pinkish at base. *Carpels* usually somewhat pilose.

EUROPEAN DISTRIBUTION: Britain, Denmark, Germany, Ireland, Holland, Norway. A common species of N.W. Europe.

VICTORIAN DISTRIBUTION: [Fig. 13] Clunes, Creswick and 2 miles north of Tannybryn. Not abundant.

SPECIMENS EXAMINED: Victoria—Creswick, *R. L. Amor* RA24, i.1967 (CGE; KTRS*; MEL 500015, 500016, 500017); Tannybryn, *R. L. Amor* 35, i.1967 (KTRS; MEL 500018).

* Keith Turnbull Research Station, Frankston, Victoria.

R. selmeri Lindeb. (1884) was relegated to the synonymy of *R. nemoralis* P. J. Muell. (1858) by W. C. R. Watson (1958, p. 66). *R. selmeri* has been used by nearly all European botanists for this common and well-known species of N.W. Europe. However, this name has been used for several different species and its correct application is in doubt.

2. ***Rubus laciniatus*** Willd. in *Hort. Berol.* 2 (7): pl. lxxxii (1806); Rogers *Handb. Brit. Rubi* vii (1900); *Sudre Rubi Eur.* 55 (1909); Focke in *Bibliotheca Bot.* 83: 134 (1914); W. C. R. Watson *Handb. Rubi Gt. Britain Ireland* 67 (1958); Y. Heslop-Harrison in Tutin et al. *Fl. Europaea* 2: 13 (1968). [Fig. 14.]

Stem and leaves as in *R. selmeri*, but leaflets deeply lacinate, often divided to midrib. *Inflorescence* variable in outline, often more or less cylindrical, all branches armed with strong, large-based, deflexed, falcate prickles. *Sepals* with long (up to 4mm) linear tips (the tips sometimes greatly enlarged into leafy structures) their outer surfaces densely pilose and tomentose, with numerous tiny pricklets. *Petals* pink or white, longer than in *R. selmeri* (up to 15mm), obovate, very variable at apex, sometimes deeply notched, sometimes rounded, sometimes mucronate. *Anthers* at same level as stigmas; filaments often pinkish at base. *Carpels* glabrous or slightly pilose.

EUROPEAN DISTRIBUTION: Cultivated for ornament and widely naturalized in many areas. Origin unknown.

VICTORIAN DISTRIBUTION [Fig. 15]: Otway Ranges, Central Victoria, Dandenong Ranges, Gippsland, North-eastern Victoria. Widespread, but not abundant, characteristically occurring as widely spaced, bird-sown plants.

SPECIMENS EXAMINED: Victoria—Lavers Hill, *R. L. Amor s. n.*, i.1969 (CGE; KTRS; MEL 500019); Ballarat, *H. Balde HB3* (KTRS; MEL 500020, 500021); Balook, *R. L. Amor RA8*, i.1967 (KTRS; MEL 500022, 500023).

3. ***Rubus polyanthemus*** Lindeb. *Herb. Rub. Scand.* 1: no. 16 (1882) et in *Bot. Not.* 1883: 105 (1883); Neuman in *Kongl. Vetensk. Akad. Förh. Stockholm* 1883 (8): 65 (1883); *Sudre Rubi Eur.* 61 (1909); W. C. R. Watson *Handb. Rubi Gt. Britain Ireland* 89 (1958); Y. Heslop-Harrison in Tutin et al. *Fl. Europaea* 2: 14 (1968). *R. pulcherrimus* Neuman in *Lunds. Bot. Foreningsbyteskatalog* (1882); Rogers *Handb. Brit. Rubi* 32 (1900); Focke in *Bibliotheca Bot.* 83: 125 (1914); non W. J. Hooker in *Icones Pl.* 8: dcxxx (1848). *R. neumanii* Focke in *Potonie Illust. Fl. Nord- und Mittel-Deutschl.* 257 (1886); Frider & Gelert in *Bot. Tideskr.* 16: 79 (1888). [Fig. 16.]



Fig. 14.—*R. laciniatus*. Scale = 5cm.

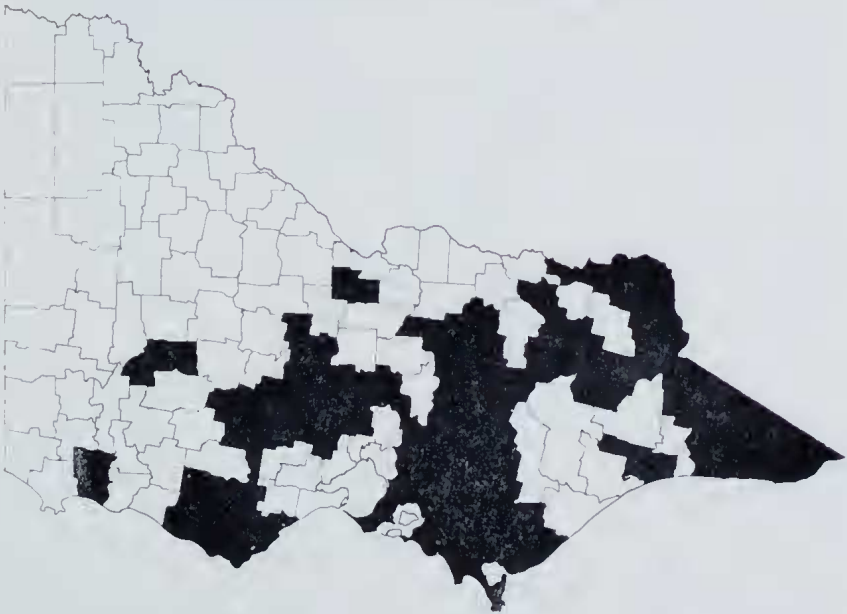


Fig. 15.—Distribution of *R. laciniatus* in Victoria, based on presence in Lands Department Inspectors' Districts.

Stem brown or pinkish, sparsely pilose when young, glabrescent, eglandular, not tomentose; faces usually more or less flat; prickles mostly deflexed, some more or less patent. *Leaves* 5-partite; petioles and petiolules pilose and often also thinly tomentose, armed with falcate and deflexed prickles; upper surface of leaflets sparsely pilose, lower surface green or grey-green, (subglabrous-) thinly-moderately pilose, not or thinly tomentose, armed with falcate and deflexed prickles; suborbicular, apex acuminate, base rounded. *Inflorescence* more or less cylindrical in outline, with single leaf above ternate leaves, rachis and all branches pilose and green to greyish-



Fig. 16.—*R. polyanthemus*. Scale 5cm.

tomentose, armed with mostly deflexed prickles, glands none to numerous, up to 0.5mm long. *Sepals* with short (usually up to 2.5mm long) linear tips; their outer surfaces grey tomentose and very shortly pilose, pricklets very rare or none; bases of inner surfaces rarely turning crimson during fruit development. *Petals* pale pink or white, 8–13mm long, suborbicular, 1.0–1.4 times as long as broad, rounded or slightly notched at apex. *Anthers* at higher level than stigmas; filaments white or pinkish. *Carpels* glabrous or with few hairs.

EUROPEAN DISTRIBUTION: Britain, Denmark, Germany, Ireland, Holland, Sweden.

VICTORIAN DISTRIBUTION [Fig. 17]: Otway Ranges, Ballarat, Clunes, Erica, South Gippsland Hills, East Gippsland.

SPECIMENS EXAMINED: Victoria—Beech Forest, *R. L. Amor* RA20, i.1967 (KTRS; MEL 500024, 500025, 500026); Lorne, *R. L. Amor* RA17, i.1967 (KTRS; MEL 500027, 500028, 500029); Daylesford, *H. Balde* HB4, ii.1967 (CGE; KTRS; MEL 500030); Warragul, *R. L. Amor* RA4, i.1967 (KTRS; MEL 500031, 500032, 500033); Erica, *R. L. Amor* RA6, i.1967 (KTRS; MEL 500034, 500035).

4. *Rubus cissburiensis* Barton & Riddelsd. in *Journ. Bot. (London)* 69: 238 (1931). *R. erythrinus* forma *glandulosus* Rogers in *Rep. Bot. Soc. Exch. Cl. Brit. Isles* 1: 542 (1898 pro



Fig. 17.—Distribution of *R. polyanthemus* in Victoria, based on presence in Lands Department Inspectors' Districts.

1897). *R. separinus* sensu W. C. R. Watson *Handb. Rubi Gt. Britain Ireland* 93 (1958), non Genev. in *Mem. Soc. Acad. (Angers)* 8:90 (1860). [Fig. 18.]

Stem purplish to very deep blackish-purple, becoming scaly as it gets older, glabrous or nearly so, eglandular, not tomentose; faces flat or sometimes convex; prickles mostly deflexed, some more or less patent or slightly falcate. *Leaves* most 5-partite; petioles and petiolules subglabrous, very sparsely tomentose, sometimes with a very few glands, armed with falcate, deflexed prickles; upper surface of leaflets glabrous; lower surface green to greyish tomentose and thinly pilose below; terminal leaflet elliptical, rarely obovate, apex acuminate, base rounded.

Inflorescence pyramidal or less often more or less cylindrical in outline, with two or more simple leaves above ternate leaves; lower part of rachis subglabrous, upper part of all branches thinly grey-green tomentose and sparingly pilose, armed with mostly deflexed prickles and often also pricklets, glands numerous, the largest about 1.5 (—2)mm long. *Sepals* with linear tips, often more than 2.5mm long; their outer surfaces



Fig. 18.—*R. cissburiensis*. Scale = 5cm.

clothed as the upper panicle branches; bases of inner surfaces becoming crimson during fruit development. *Petals* at first pinkish, but soon turning white, 8–15mm long, rhomboid to elliptic, 1.5–1.8 times as long as broad, usually notched at apex. *Anthers* at higher level than stigmas; filaments white. *Carpels* sparingly pilose.

EUROPEAN DISTRIBUTION: Known certainly only in S.E. England, but possibly also in France.

VICTORIAN DISTRIBUTION [Fig. 19]: Otway Ranges, Panmure, Rubicon River, Budgeree East.

SPECIMENS EXAMINED: Victoria—Eildon, *R. L. Amor* RA16, ii.1967 (KTRS; MEL 500036, 500037, 500038); Morwell, *R. L. Amor* RA7, i.1967 (KTRS; MEL 500039, 500040); English's Corner, *H. Balde* 43, ii.1968 (KTRS; MEL 500041, 500042).

R. cissburiensis Barton & Riddelsd. (1931) was relegated to the synonymy of *R. separinus* Genev. (1860) by W. C. R. Watson



Fig. 19.—Distribution of *R. cissburiensis* in Victoria, based on presence in Lands Department Inspectors' Districts.

(1958: 93). The holotype of *R. cissburiensis* in the British Museum (Nat. Hist.) has been examined by one of us (B.A.M.) whereas no lectotype has been selected for *R. separinus*, and its identity with the English *R. cissburiensis* in questionable.

5. ***Rubus ulmifolius*** Schott in *Isis* 1818: 821 (1818); Sudre *Rubi Eur.* 69 (1909); Focke in *Bibliotheca Bot.* 83: 153 (1914); W. C. R. Watson *Handb. Rubi Gt. Britain Ireland* 97 (1958); Y. Heslop-Harrison in Tutin et al. *Fl. Europaea* 2: 15 (1968). *R. rusticanus* Merc. in Reuter *Cat. Pl. Vasc. Geneve* ed 2, 279 (1861); Rogers *Handb. Brit. Rubi* 40 (1900). *R. discolor* auct. mult., non Weihe & Nees *Rubi Germ.* 30 (1824). [Fig. 20.]



Fig. 20.—*R. ulmifolius*. Scale = 5cm.

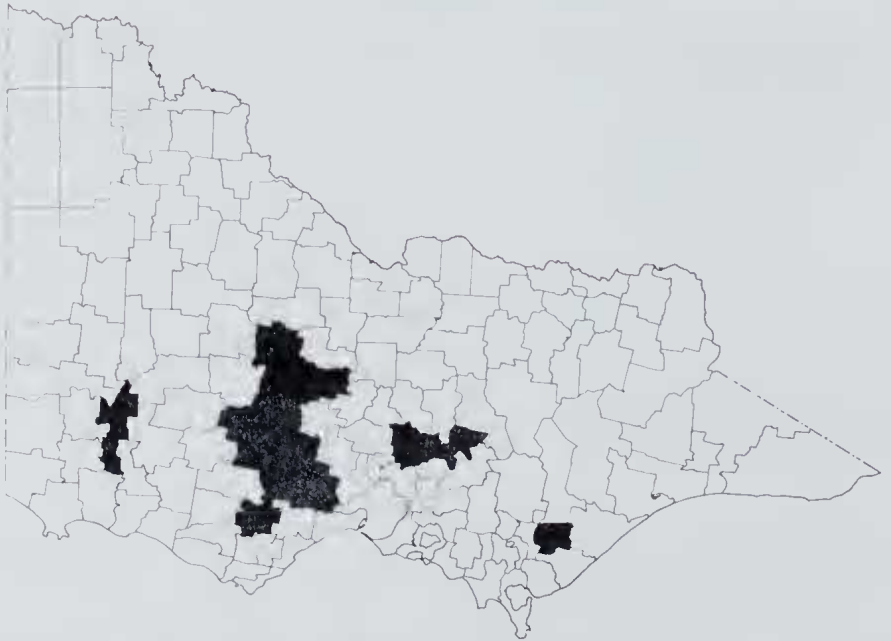


Fig. 21.—Distribution of *R. ulmifolius* in Victoria, based on presence in Lands Department Inspectors' Districts.

Stem blackish-purple, developing a scaly whitish covering as it ages, glabrous or nearly so, eglandular, not tomentose; faces flat or concave; prickles few to numerous, patent, deflexed or falcate. *Leaves* 5-partite; petioles and petiolules thinly pilose and tomentose, becoming scaly like the stem, armed with short, but large-based mostly falcate prickles; leaflets subcoriaceous, upper surface subglabrous, densely and closely white tomentose, but the lower surface only slightly or not pilose; terminal leaflet very variable in shape, most commonly oblong, but sometimes obovate or broadly elliptical, apex mucronate or less often acuminate, base rounded. *Inflorescence* narrowly cylindrical, occasionally broadly pyramidal in outline, more or less leafless in the flowering part; rachis and all branches grey-whitish tomentose, not or very thinly pilose, eglandular, prickles very variable as on stem. *Sepals* with very short (less than 1mm long) linear tips, their outer surfaces white-tomentose not or hardly pilose, eglandular, pricklets none. *Petals* usually deep pink, 7–9mm long, crumpled, suborbicular, margins wavy. *Anthers* at same level as stigmas; filaments and styles pink. *Carpels* more or less pilose.

EUROPEAN DISTRIBUTION: South, west and central Europe as far north as Germany, Holland, and N. England (also in N. Africa and parts of western Asia).

VICTORIAN DISTRIBUTION [Fig. 21]: Mainly in the Ballarat-Daylesford districts, but with isolated patches at Hamilton, Colac, Kinglake and Traralgon.

SPECIMENS EXAMINED: Victoria—Ballarat, *H. Balde* HB2, i.1967 (CGE; KTRS; MEL 500043, 500044); Ballarat, *R. L. Amor* RA23, i.1967 (KTRS); MEL 500045, 500046); Mt. Slide, *R. L. Amor* s.n., i.1968 (CGE; KTRS; MEL 500047, 500048).

A very distinct, yet variable sexually reproducing species. It is sometimes difficult to tell whether a plant is a variant of this species or a hybrid with a closely related pseudogamous one. If the pollen is partly sterile and the fruit imperfect, a hybrid origin may be suspected.

6. *Rubus ulmifolius* hybrids.

Resemble *R. ulmifolius* in the scaly stems; white tomentose lower surface of leaflets; eglandular inflorescence; densely white tomentose, very short-tipped sepals; pink, crumpled, suborbicular petals with wavy margins; anthers at same level as stigmas; pink filaments and styles and pilose carpels. Differ from *R. ulmifolius* in the moderately to strongly pilose stem; often 3-partite leaves; pilose leaflets; elliptical to suborbicular, often cordate-based terminal leaflet; rachis and all branches of inflorescence pilose; and imperfect fruit. Not all plants possess all resemblances and all differences mentioned above.



Fig. 22.—*R. ulmifolius* x (?) hybrid. Scale — 5cm.



Fig. 23.—Distribution of *R. ulmifolius* hybrids in Victoria, based on presence in Lands Department Inspectors' Districts.

EUROPEAN DISTRIBUTION: Throughout the range of *R. ulmifolius*.

VICTORIAN DISTRIBUTION [Fig. 23]: Widely distributed, growing north of the Dividing Range in drier areas than other species with the exception of *R. procerus*. Common in old gold mining districts and the dominant form of blackberry in south-



Fig. 24.—*R. procerus*. Scale 5cm.

western Victoria (west of the Otway Ranges), in the Foster Hills, and north of the Dividing Range. In other areas *R. ulmifolius* hybrids are less abundant and there is usually more *R. procerus* or *R. polyanthemus*.

SPECIMENS EXAMINED: Victoria—Bethanga, R. L. Amor RA2, i.1967 (KTRS; MEL 500049, 500050, 500051); Foster, H. Balde 42, ii.1968 (CGE; KTRS; MEL 500052, 500053, 500054); Flinders, R. L. Amor RA5, i.1967 (KTRS; MEL 500055, 500056, 500057, 500058); Warragul, R. A. Amor RA3, i.1967 (KTRS; MEL 500059, 500060).

R. ulmifolius hybrids occur extensively in England and it is not surprising that they have become naturalized. In Victoria they are variable, but separation into several categories is not considered to be desirable. In Europe unless a *R. ulmifolius* hybrid is found growing with its other parent, it is almost impossible to be certain of the identity of that parent, as the characters of *R. ulmifolius* predominate. The parentage of the hybrids in Victoria can only be guessed, but it is suspected that *R. vestitus* may be a parent of some of the hybrids. *R. ulmifolius* x *R. vestitus* hybrids are common in England.



Fig. 25.—Distribution of *R. procerus* in Victoria, based on presence in Lands Department Inspectors' Districts.

7. ***Rubus procerus*** P. J. Muell. in *Boulay Ronces Vosg.* 7 (1864); *Sudre Rubi Eur.* 87 (1910). *R. hedycarpus* subsp. *procerus* (P. J. Muell.) Focke in *Bibliothca Bot.* 83: 162 (1914). *R. discolor* sensu Y. Heslop-Harrison in Tutin et. al. *Fl. Europaea* 2: 16 (1968). [Fig. 24.]

Stem brown to purple, glabrous or nearly so, eglandular, not tomentose; faces usually more or less concave; prickles mostly deflexed, a few more or less patent or slightly falcate. Leaves 5-partite; petioles and petiolules very thinly pilose and

tomentose, armed with falcate prickles; upper surface of leaflets more or less glabrous, lower surface white or greyish-white tomentose and sparingly short-pilose; terminal leaflet broadly elliptic, occasionally suborbicular, apex acuminate, base rounded. *Inflorescence* usually pyramidal in outline with a broad, blunt apex; rachis and all branches pilose and greenish-grey tomentose, particularly in upper part of rachis, armed with mostly deflexed prickles. *Sepals* with short (usually less than 2.5mm) linear tips, their outer surfaces greyish tomentose, moderately to strongly pilose (hair often yellowish), pricklets none. *Petals* pinkish, very large, 12–15mm long, broadly elliptic-



Fig. 26.—*R. vestitus*. Scale 5cm.

suborbicular, rounded or very slightly notched at apex. *Anthers* at higher level than stigmas; filaments white. *Carpels* more or less pilose.

EUROPEAN DISTRIBUTION: Eastern England, Belgium, Germany and France. Recorded from other areas, but probably due to misidentification.

VICTORIAN DISTRIBUTION [Fig. 25]: Far western Victoria, Otway Ranges, Melbourne district, throughout Gippsland and north-east Victoria, Cohuna. The most widely distributed species.

SPECIMENS EXAMINED: Victoria—Tannybryn, *R. L. Amor* s. n., i.1969 (KTRS; MEL 500061, 500062); Tecoma, *R. L. Amor* s. n., i.1969 (CGE; KTRS; MEL 500063, 500064, 500065); Rowville, *R. L. Amor* RA16, i.1967 (KTRS; MEL 500066); Frankston, *R. L. Amor* s. n., i.1969 (KTRS; MEL 500067, 500068, 500069, 500070, 500071).

Y. Heslop-Harrison (1963: 16) cites *R. procerus* P. J. Muell. (1864) as a synonym of *R. discolor* Weihe & Nees (1824). The



Fig. 27.—Distribution of *R. vestitus* in Victoria, based on presence in Lands Department Inspectors' Districts.

reason for this is that Sudre (1908–1913) has this synonymy. However, until there is proof that the two names refer to the same species, the authors prefer to use *R. procerus* by which the species is well-known, rather than *R. discolor* which has commonly been referred to the synonymy of *R. ulmifolius* Shott.

8. ***Rubus vestitus*** Weihe & Nees in Bluff & Fingerh. *Comp. Fl. Germ.* 1: 684 (1825); Sudre *Rubi Eur.* 101 (1910); Focke in *Bibliothca Bot.* 83: 194 (1914); W. C. R. Watson *Handb. Rubi Gt.*

Britain Ireland 114 (1958); Y. Heslop-Harrison in Tutin et al. *Fl. Europaea* 2: 17 (1968). *R. leucostachys* sensu Rogers *Handb. Brit. Rubi* 50 (1900) et auct. mult., non Schleicher ex Sm. *Engl. Fl.* 2: 403 (1824). [Fig. 26.]

Stem brown to purple, pilose and thinly tomentose, eglandular or nearly so; faces more or less flat; prickles mostly deflexed, a few more or less patent or slightly falcate. *Leaves* 5-partite; petioles and petiolules pilose and thinly tomentose, often with a few glands, armed with mostly falcate prickles; upper surface of leaflets sparsely pilose, lower surface densely grey to white tomentose and strongly pilose; terminal leaflet suborbicular, apex acuminate, base rounded. *Inflorescence* narrowly to broadly pyramidal in outline; rachis and all branches densely pilose and tomentose; armed with mostly deflexed prickles, glands few to numerous, the longest c. 2mm long. *Sepals* with linear tips varying from 2–4mm, their outer surfaces densely pilose and greyish tomentose, with numerous glands and pricklets. *Petals* pink or white, 10–14mm long, broadly ovate-suborbicular, rounded or less often slightly notched at apex. *Anthers* at higher level than stigmas; filaments white. *Carpels* pilose.

EUROPEAN DISTRIBUTION: From Roumania and Poland to Sweden and Ireland, south to Italy and Portugal.

VICTORIAN DISTRIBUTION [Fig. 27]: Laver's Hill, Lower Gellibrand, Panmure and at The Glut in the Beaufort district.

SPECIMEN EXAMINED: Victoria—Gellibrand River, *R. L. Amor* RA21, i.1967 (MEL 500072).

9. ***Rubus rosaceus*** Weihe & Nees in Bluff & Fingerh. *Comp. Fl. Germ.* a 1: 685 (1825) fide W. C. R. Watson in *Rep. Bot. Soc. Exch. Club. Brit. Is.* 8: 862 (1929); *Watsonia* 1: 78 (1949) et *Handb. Rubi Gt. Britain Ireland* 178 (1958). *R. viridis* sensu Rogers *Handb. Brit. Rubi* 85 (1900), non C. Presl ex Ortman in *Flora (Regensb.)* 18: 488 (1835), nec Kaltenb. *Fl. Aachen Beck* 2: 284 (1845). *R. leptadenes* var. *calliphylloides* (Sudre) Sudre *Rubi Eur.* 220 (1913) quoad loc. angl. [Fig. 28.]

Stem becoming blackish-purple on exposure, slightly pilose, not tomentose, strongly glandular; faces more or less flat, prickles weak, mostly falcate, pricklets numerous. *Leaves* 3–5-partite; petioles and petiolules thinly pilose, not tomentose, strongly glandular, armed with many small mostly falcate prickles and pricklets; upper surface of leaflets subglabrous, lower surface subglabrous to rather thinly pilose (never tomentose); terminal leaflet broadly ovate or elliptic, apex acute to slightly acuminate, base rounded. *Inflorescence* pyramidal in outline, with long lower branches and a narrow apex; rachis and all branches thinly pilose, not tomentose, armed with weak,

falcate prickles and abundant pricklets, glands very abundant, the longest c. 2.5 (—3) mm. *Sepals* with linear (or often leafy) tips 2–6 mm long, their outer surfaces green (hardly tomentose) with conspicuous white tomentose margins slightly pilose, densely glandular, pricklets often numerous. *Petals* pinkish, 8–12 mm long, narrowly elliptic, rounded at apex. *Anthers* at same level or slightly higher than stigmas; filaments white, styles pink to purple based. *Carpels* pilose.

EUROPEAN DISTRIBUTION: S.E. England, mainly in woods; Belgium; W. Germany.



Fig. 28.—*R. rosaceus*. Scale — 5 cm.

VICTORIAN DISTRIBUTION [Fig. 29]: Digby, Portland, Mt. Eccles, Lavers Hill, Gellibrand River.

SPECIMENS EXAMINED: Victoria—Digby, *R. L. Amor* s. n., i.1969 (KTRS; MEL 500080, 500081, 500082); Portland, *R. L. Amor* RA22, i.1966 (KTRS; MEL 500074, 500075, 500076, 500077, 500078); Laver's Hill, *R. L. Amor* s. n., i.1968 (KTRS; MEL 500083, 500084); Laver's Hill, *R. L. Amor* s. n., i.1969 (CGE; MEL 500073, 500079).

Victorian specimens have been matched only with those of England. No specimens of *R. rosaceus* from Continental Europe have been seen, and it may be, on the basis of descriptions, that the British plant is different and requires a new name. The name *R. rosaceus*, however, is retained until this can be proved.

DISCUSSION

R. procerus, *R. ulmifolius* hybrids, and *R. polyanthemus* are the most widespread and abundant species of blackberry in Victoria. *R. laciniatus* grows in several districts, but never occurs extensively in any one district. *R. selmeri*, *R. cissburiensis*,



Fig. 29.—Distribution of *R. rosaceus* in Victoria, based on presence in Lands Department Inspectors' Districts.

R. ulmifolius, *R. rosaceus* and *R. vestitus* have a limited distribution and these taxa are all common in south-east England (Watson, 1958).

Their scattered distribution in Victoria suggests that there were several introductions. Blackberry was introduced into Victoria by early settlers from the British Isles, and the first

Director of the Melbourne Botanic Gardens recommended the planting of blackberry as a source of fruit and for the prevention of soil erosion in valleys. Several species were planted in the Botanic Gardens and subsequently "rendered available to various districts of the Colony" (Mueller, 1862). In addition to Mueller's introductions, the *R. ulmifolius* hybrid growing at Marong was probably introduced as seed from Scotland by an early settler (Wakefield, 1961). The most likely explanation for the present distribution of the species is that some were planted more extensively than others. It is assumed that few blackberries were planted after 1908 when *R. fruticosus* was declared a noxious weed for the whole State (Gov. Gaz., 1908).

It is possible that some early settlers grew several species of blackberry in order to have a range in maturity and flavour of berries. Evidence of this can be seen in a derelict garden at Creswick where there are old thickets of *R. ulmifolius*, *R. polyanthemus*, *R. selmeri* and *R. laciniatus*. The *R. vestitus*, *R. polyanthemus*, *R. rosaceus* and *R. laciniatus* along the Gellibrand River may also have originated from a neglected garden from which seed was dispersed by birds and foxes. In some areas only one species was planted e.g. *R. procerus* in the old mining and logging sites along the Omeo Highway in eastern Victoria.

The restricted local distribution of *R. laciniatus* compared with those of other species present in many districts—*R. procerus*, *R. ulmifolius* hybrids and *R. polyanthemus*—may be influenced by its method of reproduction. *R. laciniatus* occurs as bird-sown plants which do not root at the cane apices as frequently as the other species and do not develop extensive thickets. Restricted spread of *R. laciniatus* has been described over a longer period in England, where it was first recorded as a garden plant in 1754 (Watson, 1958).

In Victoria, blackberry grows only on land that has been disturbed by European man. It occurs where the average annual rainfall is greater than 760mm and also along creeks and irrigation-channel banks in drier areas (Amor, 1968). There is no clear evidence that the taxa naturalized in Victoria have different climatic or soil requirements for growth. The growth of *R. ulmifolius* hybrids north of the Dividing Range is associated with dry areas and neutral to alkaline soils, compared with wetter areas and acidic soils south of the Range. It could therefore be postulated that the *R. ulmifolius* hybrids have a greater tolerance of moisture stress and soil alkalinity than other species. The evidence that in Europe *R. ulmifolius* is one of the few species tolerant of these conditions supports this hypothesis. However, the correct explanation may be simply that other species were not introduced into these areas by the early settlers.

There is no evidence that hybrids between the species described have been formed in Victoria. Because of the abundance of hybrids in Europe, however, hybridization is to be expected in the future.

ACKNOWLEDGMENTS

The senior author would like to express his gratitude to Mr. P. D. Sell, Botany School, Cambridge University, for his assistance following the death of Mr. Miles. Without Mr. Sell's organization of herbarium specimens and revision of an early draft, the manuscript could not have been completed. Thanks are also due to Mr. E. S. Eedes, 23 Dartmouth Avenue, Newcastle, Staffordshire, for confirmation of the identifications. This paper was included in a Ph.D. Thesis presented to the Botany Department, Monash University. It is a pleasure to acknowledge the constructive criticism of my supervisor Dr. D. M. Churchill. I am grateful to Mr. J. H. Willis, formerly of the National Herbarium, Melbourne, for advice during the early stages of the study. The assistance of the Inspectors and Drafting Section of the Victorian Department of Crown Lands and Survey, and that of Mr. H. Balde, formerly of the Keith Turnbull Research Station, in mapping the distribution of species is also gratefully acknowledged. The project was supported by a grant from the Australian Dairy Produce Board, and I was able to visit the late Mr. Miles while under the tenure of a Winston Churchill Travelling Fellowship.

REFERENCES

- Amor, R. L. (1968).—Some effects of land utilization on the distribution and control of blackberry (*Rubus fruticosus* L.) in Victoria. *Proc. 1st Vict. Weed Conf.* 5/16-5/23.
- Bailey, L. H. (1941).—Species Batorum. The genus *Rubus* in North America. *Genes Herb* 5 : 11.
- Beadle, N. C. W., Evans, O. D., and Carolin, R. C. (1962).—Handbook of the vascular plants of the Sydney district and Blue Mountains. (Univ. New England: Armidale.)
- Curtis, W. M. (1956).—The student's flora of Tasmania. (Govt. Printer: Hobart.)
- Eedes, E. S. (1959).—The difficulties of a *Rubus* referee. *Proc. Bot. Soc. Brit. Isl.* 3 : 281-2.
- Eichler, H. (1965).—Supplement to Flora of South Australia. (Govt. Printer: Adelaide.)
- Everist, S. L. (1957).—Common weeds of farm and pasture. (Govt. Printer: Brisbane.)
- Ewart, A. J. (1930).—Flora of Victoria. (Govt. Printer: Melbourne.)
- Government Gazette (1908).—Certain plants declared to be thistles throughout the State of Victoria. *Govt. Gaz. Vic.* No. 13, p. 677, 29 Jan. 1908.
- Gustafsson, A. (1942).—The origin and properties of the European blackberry flora. *Hereditas, Lund* 28 : 249-277.

- Heslop-Harrison, Y. (1953).—Cytological studies in the genus *Rubus* L. I. Chromosome numbers in the British *Rubus* flora. *New Phytol.* 52: 22-39.
- Heslop-Harrison, Y. (1968).—*Rubus* L. in *Flora Europaea*. II. Rosaceae to Umbelliferae. (University Press: Cambridge.)
- Meadly, G. R. W. (1965).—Weeds of Western Australia. (Govt. Printer: Perth.)
- Mueller, F. (1862).—Annual report of the Government Botanist and Director of the Botanic Garden, 1861-2. (Govt. Printer: Melbourne.)
- Wakefield, N. (1961).—Baron von Mueller and the blackberries. *Victorian Nat.* 77: 258.
- Watson, W. C. R. (1958).—Handbook of the *Rubi* of Great Britain and Ireland. (Univ. Press: Cambridge.)
- Whittet, J. N. (1958).—Weeds. (Govt. Printer: Sydney.)